

# The Comparison of the Effects of Inflation Rate, Interest Rate, Exchange Rate and Liquidity Growth Rate on Export-Based Industries with Import-Based Industries

Alireza Momeni<sup>1</sup>, Mohammad Behroozi<sup>2</sup> and Mansoureh Anbavi<sup>3,\*</sup>

<sup>1</sup> PhD of accounting, Assistant professor of Payam-e Noor University, Tehran

<sup>2</sup> PhD of educational management, Assistant professor of Islamic Azad University of Bushehr

<sup>3</sup> MA student of Department of accounting, Bushehr branch, Islamic Azad University, Bushehr, Iran

## ABSTRACT

This study compares the effect of variables including inflation rate, interest rates, exchange rates and liquidity growth rate on return of sales of the export-based with import-based industries. To do this, the data of chemical and automobile industry are discussed for the period 2007 to 2012. To find the effects and determining the relationship between studied variables, random coefficients regression method is used by panel data. The results show that in export-based industries, the relationship between inflation rate, exchange rate, and liquidity growth rate with return of sales is positive and significant, but in import-based industries, this relationship is inverse and significant. Also, the relationship between bank interest rates with the return of sales is negative and inverse. And in the import-based industries, this relationship is direct and significant. The result of Wald test showing the overall significance regression indicated that, inflation rates, bank interest rates, exchange rates and liquidity growth rate, on return of sales are effective in two chemical and automobile industries.

## KEYWORD

Export-based industries, Import-based industries, Inflation rate, Bank interest rate, Exchange rate, Liquidity growth rate, Panel data

## INTRODUCTION

Different industries are active in stock exchange market and in some industries, the raw materials of their productions are in the country and our country is self-

sufficient regarding these industries as chemical industry. These industries export their products to other countries and they are called export-based industries. However, there are industries requiring raw materials for their productions as automobile industry. The self-sufficiency of the country in all fields and the increase of export-based industries are the ideals of any country. On the other hand, there are some factors in economy as each can affect the economy of the country. Some of the factors include existing inflation rate in country, exchange rate and bank interest rate determined by financial authorities of the country and existing liquidity of the country and also liquidity growth rate. This study evaluated the impacts of each of factors on two chemical and automobile industries and compared the impacts of these factors on export and import-based industries.

## REVIEW OF LITERATURE

Various researchers attempt to find the impacts of variables including inflation rate, bank interest rate, exchange rate and liquidity growth rate and some examples are including:

Noel Dilrukshan Richards & John Simpson (2007) [15] in a study showed that time series regression results indicated a short-term positive relationship between exchange rate of Australia dollar and stock price in the sample period. The results of study of Michael D. Bordo & Michael J. Dueker & David C. Wheelock (2008) [14] showed that inflation reduction shock leads to the promotion of stock market and this inflation shock leads to stagnation. In addition, they found that inflation shocks can create changes in actual price of stock. FOO ZOR THANG (2009) [9] investigated the impact of interest rate and exchange rate on stock market of Malaysia. The results of his study showed that interest rate and exchange rate had negative effects on stock market index in long-run and short-run.

\*Corresponding Author: mansoureh anbavi  
E-mail r: anbavi.m@gmail.com  
Telephone Number r: 09171779935

Fax. Number r:

Md. Mahmudul Alam·Md. Gazi Salah Uddin (2009) [12] investigated the reasons of market inefficiency, relationship between stock price and interest rate and applied time series and panel regression to evaluate the changes of stock price and interest rate changes. They found that there was a negative and significant association between interest rate and stock price. Dr. Gaurav Agrawal· Aniruddh Kumar Srivastav· Ankita Srivastava (2010) [10] in an empirical research investigated the dynamics between stock return fluctuations and exchange rate changes of US dollar and Rupie of India. The result of correlation coefficient determination showed low and negative correlation between two variables. The results of Granger test to determine the causal relationship between two variables showed a one-way relation between stock return and exchange rate. Mian Sajid Nazir·Muhammad Bilal Khalid, Adil Shakil, and Syed Muhammad Moez Ali (2010) [13] presented a study under the influence of liberalization of macro-economic factors on stock market return. This study evaluates the impact of financial liberalization by considering macro-economic variables as inflation, interest rate, exchange rate, per capita income and political stability index by monthly data and formal liberalization of stock markets of Pakistan (February 1991). The results of EGARCH model showed that inflation rate, interest rate and exchange rate had negative impact on return and fluctuations of stock in stock market of Karachi. Akingunola Richard.O Ph.D·Adekunle.O.A·Ojodu Hammed (2011) [8] investigated the impact of interest rate on capital market and also investigated the impact of other macro-economic variables as inflation rate and exchange rate on stock market growth. The results of Dickey Fuller test showed that interest rate had negative impact on capital market growth and the results of regression analysis showed that 1% increase in interest rate reduces 44% in stock price index and it means the increase of interest rate reduces capital market performance but this relation is not significant for inflation rate and exchange rate at significance level 5%. Hieu Tran (2013) [11] in a study showed that normal stock return of banks is sensitive to the changes of long-term interest rate.

Hamed Taheri and Milad Sarem Safari (2011) [3] in a study “investigation of the relationship between exchange rate and stock market price index in Tehran: By ARDL approach” investigated the long-run relationship between stock price index in TSE by exchange rate variable. This study was conducted by monthly data during 2002-2008 by auto regressive distributed lag (ARDL) method. The results of the study showed that stock market price is positively associated with actual exchange rate. Seyed Jamaodin Mohseni Zanuzi, Parisa Johari Salmasi and Alireza Helali (2011) [2] in a study investigated the long-term convergence of bank interest rate with stock market return in Iran. The results showed that there is no long-run relation between these two variables. Ali Falahati, Kiomars Soheili and Farzad Noori (2010) [5] in a study “impact of inflation on financial markets performance in Iran investigated the impact of inflation on monetary and capital markets. The results of the estimated model showed that there was a negative relation between inflation and financial

development indices of monetary market and positive relationship between inflation and stock market development indices. Ali Falahati, Kiomars Soheili, Farzad Noori (2010) [5] in a study “inflation effect on financial markets performance” investigate the inflation effect on monetary and capital markets. The results of the estimated model showed that there was a negative relation between inflation and financial development indices of monetary market and there was a positive relationship between inflation and stock market development indices. Firooze Gharizi, Hassan Khodaveisi, Fateme Johari (2010) [4] in a study “investigation of the relationship between inflation and stock return in TSE evaluated FAMA substitution hypothesis. The empirical results showed that Fischer experience regarding the real return of stock was independent from inflation and normal stock was a complete shield to inflation, it is rejected in short-run and TSE was a weak shield to inflation. Meysam Musayi, Nader Mehregan and Hossein Amiri (2010) [7] in a study “relationship between stock market and macro-economic variables in Iran” investigated co-integration and causality between macroeconomic variables and total stock price index. Based on the results of causality test of Granger, total stock price index had not significant impact on GDP but macro variables were effective on prosperity and stagnation of stock market. Shahnaz Mashayekh and Hadise Haji Moradi (2008) [6] in a study found that inflation in long-run had positive and significant relation with stock market variables. The increase of bank interest rate reduces return and growth rate of transaction of stock via investment attraction.

#### STUDY VARIABLES AND HYPOTHESES

The studied variables are inflation rate, bank interest rate, exchange rate and liquidity growth rate and sale return of the companies listed on TSE. Inflation rate, bank interest rate, exchange rate and liquidity growth rate are independent variables and sale return is dependent variable. Inflation rate includes annual inflation rate collected from the files of central bank site in the studied period. Bank interest rate includes one-year deposit profit of state banks in the studied period. The data of exchange rate include the non-official exchange rate mean in the studied years collected from the fields of central bank site. Liquidity growth rate includes the liquidity growth of one year compared to the previous year. Return on sale is achieved by dividing net profit by net sale. The information of each of the constituent factors of financial statements of one year of the firms listed on TSE is collected from chemical and automobile industries. The study hypotheses include as follows:

1. There is a significant association between inflation rate and return on sale of the firms.
2. There is a significant association between interest rate and return on sale of firms.
3. There is a significant association between exchange rate and return on sale of firms.
4. There is a significant association between liquidity growth rate and return on sale of firms.

### STUDY PERIOD AND STUDY AREA

This study is based on the data collected during 2007 to 2012 from the companies listed on TSE in chemical and automobile industries.

### THE STUDIED MODEL

To investigate the impact of inflation rate, bank interest rate, exchange rate and liquidity growth rate on return on sale, multi-variate regression model is used. The term regression means returning and it shows that one variable returns to another one. This term was used for the first time by Francis Galton (1877). Later, statistics experts attempted to develop the relations by which we can find varied value based on two or some other variables and multi-variate regression was used. In regression, we can estimate math equation and its analysis as we can determine unknown varied quantity by known variables and we can determine the type of relation and relation extent to link the variables (Azar, Momeni, 1998, p.190-191) [1]. Thus, the applied model of the study is as:

$$RS = \alpha + \beta_1 \text{CPI} + \beta_2 \text{IR} + \beta_3 \text{EX} + \beta_4 \text{RCASH} + \epsilon_{it}$$

Where, RS is return on sale as net profit divided by net sale of firm, CPI is inflation rate, IR bank interest rate and EX is exchange rate and RCASH is liquidity growth rate. Both independent variables entered at the same time in the model. The statistical method in the study is panel data method.

### A) Performing tests in chemical industry

Now, petrochemical industry is composed of 31 firms listed on TSE and after the investigations, 18 firms are included in the study. As in panel method, the number of firms is multiplied by the number of years, the number of observations in petrochemical industry is 108.

#### A, A) Stationarity test of variables

To test stationarity of variables, Levin, Li and Chow test is used and the results are shown in Table (A,A) As shown, all variables are stationary.

Table A.A. The results of Levin, Li and Chow

Significance	Test statistics	Variable
0.0000	-3.86438	rs
0.0000	-1.64000	cpi
0.0000	-16.3910	ir
0.0000	-8.47300	ex
0.0000	-22.6684	rcash

### A, B) The results of model selection tests to estimate model

To investigate whether panel method is a suitable method compared to other methods, Chow or constrained F test is used. The results of Chow test are shown in Table (A,B). As significance level is less than 0.05, panel method is a good

method. As significance level of Hausman test is above 0.05, random effects method is good for model estimation.

Table A,B. The results of model selection tests to estimate model

Significance level	Test statistics value	Test statistics	Test
0.0000	5.98	F	Chow test
1.0000	0.0000	$\chi^2$	Hausman test

### A, C) The tests of assumptions of linear regression model

To investigate the Heteroscedasticity of variance, Likelihood-ratio test(LR) test is used. As significance of test is less than 0.05, the variables have variance Heteroscedasticity. To test autonomy of errors and auto-correlation problem, Woold ridge test is used. The test significance in petrochemical industry is below 0.05 and it is defined the data has auto-correlation. Table (A,C) shows the results of model.

Table A,C. The results of Heteroscedasticity test of variance and errors auto-correlation

Significance	Test statistics	Test
0.0000	103.94	Likelihood test
0.0003	22.188	Woold ridge test

### A, D) The estimation of model by random coefficients regression GLS by considering data auto-correlation

As the data have variance Heteroscedasticity, for model estimation, we should apply random coefficients regression GLS but in petrochemical industry, the data have auto-correlation problem and regression model GLS with auto-correlation problem is applied considering the variance Heteroscedasticity and auto-correlation at the same time. The, the relations of variables are estimated. Table (A,D) shows the results of coefficients estimation of model.

Table A,D. The results of model coefficients estimation by GLS method

Test significance	Degree of freedom	Coefficients sensitivity	RS
0.0021	3.15	1.889669	CPI
0.070	-1.81	-7.352504	IR
0.074	1.79	0.0025804	EX
0.076	1.77	1.041199	RCASH
Wald statistics			
Wald $\chi^2(4) = 16.78$			
Prob = 0.0021			

### A, E) The results of hypotheses test in petrochemical industry

First hypothesis: There is a significant relationship between inflation rate and return on sale of firms. As shown

in Table (A,D), the significance of relationship between inflation rate and return on sale in petrochemical industry is below 0.05 (0.0021). Thus, H<sub>0</sub> is supported and first hypothesis is supported at confidence interval 95%. The positive sensitivity number of coefficients shows the direct relation between two variables and show the inflation increase leads to the increase of return on sale of the firms in chemical industry.

Second hypothesis: There is a significant relation between bank interest rate and return on sale of the firms.

Significance of the relationship between bank interest rate and return on sale of the firms in chemical industry is 0.070 and this is less than 0.10. Thus, H<sub>0</sub> is supported and second hypothesis is supported at confidence interval 90%. Negative sign of sensitivity of coefficients between two variables shows that the relation is inverse and it shows the increase of bank interest rate reduces the return on sale of the firms in chemical industries.

Third hypothesis: There is a significant relationship between exchange rate and return on sale of the firms.

The significance of the relationship between exchange rate and return on sale of the firms in chemical industry is 0.074 and this is less than 0.10. Thus, H<sub>0</sub> is supported and third hypothesis is supported at confidence interval 90%. Based on the positive sign of sensitivity of coefficients, there is a positive and significant relation between exchange rate and return on sale of the firms in chemical industry.

Fourth hypothesis: There is a significant relation between liquidity growth rate and return on sale of firms.

As the significance of relationship between liquidity growth rate and return on sale of the firms in chemical industry is 0.076, this value is less than 0.05 and H<sub>0</sub> is supported and fourth hypothesis is supported at confidence interval 90%. Positive sensitivity sign of coefficients between liquidity growth rate and return on sale of the firms in chemical industry showed the significant and direct relation between these two variables.

#### A, F) Wald statistics analysis

Wald statistics result shows the general effect of variables on dependent variable and it is 0.0000 in petrochemical industry and it shows that generally, inflation rate, bank interest rate, exchange rate and liquidity growth rate are effective on return on sale of the firms listed on TSE.

#### B) The results of tests in automobile industry

Now, automobile industry has 31 firms listed on TSE and after the investigations, 26 firms are included in the study population. As in panel method, the number of companies is multiplied by the number of years, the number of observations in automobile industry is 156.

#### B, A) Stationarity test of variables

To test stationarity of variables, Levin Li & Chow test is used and the results of test are shown in Table (B,A). As shown, all variables are stationary.

Table B,A. The results of Levin Li & Chow

Significance	Statistics	Variable
0.0000	-34.8432	rs
0.0204	-2.04544	cpi
0.0000	-20.4435	ir
0.0000	-10.5678	ex
0.0000	-28.2724	rcash

#### B, B) The results of model selection tests for model estimation

The results of Chow test are shown in Table (B,B). As significance of test is less than 0.05, it can be said panel method is suitable. As significance level of Hausman test is above 0.05, random effects method is suitable for model estimation.

Table. B,B. The results of model selection tests for model estimation

Significance level	Test statistics	Test
0.0000	f	Chow test
1.0000	$\chi^2$	Hausman test

#### B, C) The tests of linear regression model assumptions

The results of Likelihood test showed that the variables have Heteroscedasticity of variance. As shown in results of

Table (B,C), significance of Woold ridgetest in automobile industry is above 0.05 and it can be said the data have not auto-correlation. Table( B,C) shows the results of model.

Table B,C. The results of variance Heteroscedasticity and errors auto-correlation

Significance level	Test statistics	Test
0.0000	198.22	Woold ridge test
0.1029	2.867	Likelihood test

#### B, D) Model estimation by random coefficients regression test

GLS As the data have variance Heteroscedasticity and no auto-correlation problem, random coefficients regression GLS is used for model estimation. Table( B.D) shows the results of model coefficients estimation.

Table B,D. The results of coefficients estimation model by GLS method

Test significance	Degree of freedom	Coefficients sensitivity	RS
.015	-2.44	-.5029475	CPI

0.008	2.64	3.932137	IR
0.064	-1.85	-.0007336	EX
0.017	-2.39	-.5615707	RCASH
Wald statistics			
Wald chi2(4) = 8.07			
Prob > chi = 0.0891			

### B, E) The results of hypotheses test in automobile industry

First hypothesis: There is a significant relationship between inflation rate and return on sale of the companies. As shown in Table(B,D), significance of the relationship between inflation rate and return on sale is 0.015.

As this value is less than 0.05, H<sub>0</sub> is supported. Thus, first hypothesis is supported at confidence interval 95% and there is a significant relationship in automobile industry between inflation rate and return on sale of the firms listed on TSE. The sensitivity of negative coefficients between inflation rate and return on sale showed the inverse relation between two variables and it shows that if inflation rate is increased, return on sale of the firms in automobile industry is reduced.

Second hypothesis: There is a significant relation between bank interest rate and return on sale of the firms.

Significance of the relationship between bank interest rate and return on sale is 0.008. As this value is less than 0.05, H<sub>0</sub> is supported and second hypothesis is supported at confidence interval 95%. According to the result of this test, there is a significant relationship between bank interest rate and return on sale of the companies of automobile industry. The sensitivity of the coefficients between bank interest rate and return on sale showed the direct relation between these two variables. If the bank interest rate is increased, return on sale of the firms in automobile industry is increased. Third hypothesis: There is a significant relation between exchange rate and return on sale of the firms. Significance of the relationship between exchange rate and return on sale is 0.064. As it is less than 0.10, H<sub>0</sub> is supported at confidence interval 90% and third hypothesis is supported. Based on the result of test, there is a significant relation between exchange rate and return on sale of the firms listed on TSE in automobile industry. The sensitivity of negative coefficients between exchange rate and return on sale indicates the inverse relation between these two variables. It shows that the increase of exchange rate can reduce return on sale of the firms in automobile industry. Fourth hypothesis: There is a significant relationship between liquidity growth rate and return on sale of the firms.

The significance of the relationship between liquidity growth rate and return on sale is 0.017. This value is less than 0.05 and H<sub>0</sub> is supported and fourth hypothesis is supported at confidence interval 95%. Based on the result of test, there is a significant association between liquidity growth rate and return on sale of the firms listed on TSE in automobile industry. The sensitivity of negative coefficients between bank interest rate and return on sale indicates inverse relation between two variables. If liquidity growth

rate is increased, return on sale of the existing companies in automobile industry is reduced.

### B, F) The analysis of Wald statistic

As it was said, Wald statistics indicate general significance of regression. As significance of Wald statistics is 0.0891 in automobile industry, generally with confidence interval 90% in automobile industry, inflation rate, bank interest rate, exchange rate and liquidity growth rate are effective on return on sale of the firms listed on TSE.

### CONCLUSION

In this study, we compared the effects of inflation rate, bank interest rate, exchange rate and liquidity growth rate on return on sale of the export and import-based companies. Chemical industry was investigated as an example of export-based industries and automobile industry as import-based industry. The results show that the impact of inflation rate, exchange rate and liquidity growth rate was significant and positive in chemical industry. By the increase of inflation rate, exchange rate and liquidity growth rate on return on sale of the firms in chemical industry are increased. The relationship between bank interest rate and return on sale of the firms in chemical industry was negative and significant. It showed that the increase of bank interest rate reduces the return on sale of the existing firms in this industry. The direct relationship between inflation rate, exchange rate and liquidity growth rate can be analyzed as in export-based industries as chemical industry, production raw materials are rich. During inflation with public increase of prices, the impact of inflation affects the sale price of these products than their costs. Indeed, during inflation, income and costs are increased both but in export-based industry, during inflation increase, the income is increased more than costs. The increase of exchange rate in export-based companies increases the income margin and revenue growth and import-based companies are faced with the increase of costs of goods and their profit and income margin are reduced. Besides the impact of increasing exchange rate on profit margin of the firms reporting their budget based on exchange rate in current year prediction, as some of petrochemical firms, the income of sale of export products is based on exchange or Rial in free market and they are faced with positive adjusting of predicted revenue.

Regarding liquidity growth rate, we can say liquidity growth rate is one of the most important factors increasing existing inflation rate in the country. Thus, increasing liquidity growth rate has positive and direct impact on return on sale of export-based industries.

In automobile industry as one of the industries dependent upon raw materials import, the effect of these factors is inverse. The results showed that the impact and relationship of inflation rate, exchange rate, liquidity growth rate on return on sale of the firms in automobile industry was negative and inverse. It shows that the increase of inflation rate, exchange rate and liquidity growth of return on sale of the firms in automobile industry are reduced. This results are analyzed as by increasing inflation, costs and sale price of products of this industry is increased as the raw materials

of these products are imported from other countries. Thus, the impact of this increase on cost is high. In order not to lose competition market, the price increase has not as costs and this increase of inflation rate has not positive impact on return on sale of automobile industry and its effect is negative. Also, regarding the increase of exchange rate, it can be said automobile industry and relevant industries to import can import their raw materials by exchange rate. By increasing exchange rate, their costs are increased. Thus, the effect of increasing exchange rate in these industries is negative. Regarding the liquidity growth rate, the increase of it can increase inflation rate. Thus, it has negative impact on return on sale of the companies in import-based industries. According to the results in both industries, this issue shows that effects of each variables of inflation rate, bank interest rate, exchange rate and liquidity growth rate on economy of the stock market companies and it emphasizes on the self-sufficiency and progress of all industries in the country. The impact of these factors on export-based companies is much better than the effect of these factors on import-based companies. Thus, helping the fulfillment of self-sufficiency ideals in all fields and export increase are of great importance.

#### REFERENCES

- [1] **Azar Adel, Momeni Mansur. 1998.** *Statistics and its use in management.* 2<sup>nd</sup> Vol. Fifteenth edition. SAMT. Tehran.
- [2] **Hassany Zanuzi; Seyed Jamalodin, Johari Salmasi; Parisa, Helali, Alireza. 2011.** *The investigation of the long-term convergence of bank interest rate with return on stock market in Iran.* *Islamic economy knowledge journal.* Year 3. Fall and Winter. 2011.p. 35-46.
- [3] **Taheri Hamed; Safari Milad. 2011.** *The investigation of the relationship between exchange rate and stock price in TSE by ARDL approach.* *Journal of economic research method.* Year 19. NO. 60, p. 63-80.
- [4] **Qarizi, Firooze; Khodaveisi, Hassan and Johari, Fateme. 2010.** *The investigation of the relationship between inflation and TSE: Evaluation of Fama substitution hypothesis.* *Journal of economic research.* Year 12. Summer 2012. P. 117-135.
- [5] **Felahati, Ali; Soheili, Kiomars; Nuri, Farzad. 2010.** *The inflation effect on performance of financial markets in Iran.* *Journal of economic researches.* Year 12. Fall 2012. jP. 133-163.
- [6] **Mashayekh, Shahnaz; Haji Moradkhani, Hadise. 1999.** *The investigation of the relationship between inflation rate, guaranteed profit rate of gold return with Iran stock market.*
- [7] **Mosayi, Meysam; Mehregan, Nader and Amiri, Hossein. 2010.** *The relationship between stock market and macroeconomic variables in Iran.* *Journal of researches and economic policies.* Year 18, Summer 2000.p.73-94
- [8] **Akingunola Richard, Adekunle, Ojodu Hamed (2011),** *Impact of Interest Rate on Capital Market Growth (A Case of Nigeria), Universal Journal of Management and Social Sciences Vol. 2, No.11; November 2012.*
- [9] **Foo zor thang (2009),** *Impact of Interest rate and Exchange Rate on the Stock Market Index in Malaysia:A Cointegration Analysis*
- [10] **Gaurav Agrawal, Aniruddh Kumar Srivastav, Ankita Srivastava (2010),** *A Study of Exchange Rates Movement and Stock Market Volatility, International Journal of Business and Management Vol. 5, No. 12; December 2010.*
- [11] **Hieu Tran (2013),** *Relationship between Interest Rate and Bank Common Stock Return: Evidence from the Top 10 United States Banks and Financial Sector Index.*
- [12] **Mahmudul Alam, Gazi Salah Uddin (2009),** *Relationship between Interest Rate and Stock Price: Empirical Evidence from Developed and Developing Countries, International Journal of Business and Management, Vol. 4, No. 3*
- [13] **Mian Sajid Nazir, Muhammad Bilal Khalid, Adil Shakil, and Syed Muhammad Moez Ali (2010),** *Post Liberalization Impact of Macroeconomic Factors on the Stock Market Returns.*
- [14] **Michael D. Bordo, Michael J. Dueker And David C. Wheelock 2008,** *Inflation, Monetary Policy and Stock Market Conditions: Quantitative Evidence from a Hybrid Latent-Variable VAR.*
- [15] **Noel Dilrukshan Richards & John Simpson, John Evans,2009,** *The Interaction between Exchange Rates and Stock Prices: An Australian Context. international journal of business and management.*